

CLAIMS

1. A component mounting method for placing components successively to component placing positions on a multiple board (12) composed of a plurality of sub-boards by component holding devices (38a, 38b, 38c, 38d, 39) equipped with a plurality of removable suction nozzles (34) which is operable to hold the components, the method comprising:

in placing the components onto the board, applying a placement step to all the sub-boards, the placement step being a step of placing onto the board all of components that are holdable by at least one identical suction nozzle out of the plurality of suction nozzles; and after completion of the placement step, changing the suction nozzle to another suction nozzle and moving to a next placement step, whereby component mounting for the individual sub-boards is carried out.

2. A component mounting method for placing components successively to component placing positions on a multiple board (12) composed of a plurality of sub-boards by component holding devices (38a, 38b, 38c, 38d, 39) equipped with a plurality of removable suction nozzles (34) which is operable to hold the components, the method comprising:

in placing the components onto the board,

applying a placement step to all the sub-boards, the placement step being a step of, with components of an identical type held on the suction nozzles, respectively, placing the plurality of held components onto the sub-boards, respectively, successively; and

after completion of the placement step, moving to a next placement step, whereby component mounting for the individual sub-boards is carried out.

3. A component mounting method for placing components successively to component placing positions on a multiple board (12) composed of a plurality of sub-boards by component holding devices (38a, 38b, 38c, 38d, 39) equipped with a plurality of removable suction nozzles (34) which is operable to hold the components, the method comprising:

after completion of component mounting for one sub-board and in performing component mounting for a next sub-board in placing the components on the board, using suction nozzles that are the last used for placing-completed sub-boards, as they are, for the next sub-board, whereby component mounting for the individual sub-boards is carried out.

4. A component mounting apparatus for mounting components onto a multiple board by using the component mounting method as claimed in any one of Claims 1 to 3.

5. A component mounting method including: moving a transfer head (28, 29) on which a plurality of component holding devices (38a, 38b, 38c, 38d, 39) operable to hold components are mounted, from component feed sections (30, 32) with a plurality of components arrayed thereon; making the components held by the component holding devices from the component feed sections; and lowering the component holding devices at over component placing positions of the circuit board (12), thereby placing the components held by the component holding devices onto the circuit board,

wherein array intervals of the component holding devices of the transfer head are coincident with at least one of component array intervals of the component feed sections and intervals of the component placing positions on the board.

6. A component mounting apparatus comprising:
a transfer-head moving device (22, 24, 26) for laterally movably supporting a transfer head (28, 29) operable to hold components and place the components onto a board (12), the transfer-head moving devices being provided above the board on which the components are to be mounted;

a plurality of juxtaposed component holding devices (38a, 38b, 38c, 38d, 39) provided on the transfer head and operable to hold the components;

a plurality of juxtaposed component feed sections

(30) having a plurality of components accommodated therein and operable to feed the components to the component holding devices; and

a component-holding-device moving mechanism (900, 901) disposed on the transfer head and operable to adjust array intervals of the plurality of component holding devices.

7. A component mounting apparatus comprising:

a transfer-head moving device (22, 24, 26) for laterally movably supporting a transfer head (28, 29) operable to hold components and place the components onto a board (12), the transfer-head moving devices being provided above the board on which the components are to be mounted;

a plurality of juxtaposed component holding devices (38a, 38b, 38c, 38d, 39) provided on the transfer head and operable to hold the components; and

a plurality of juxtaposed and arrayed component feed sections (30) having a plurality of components accommodated therein and operable to feed the components to the component holding devices,

wherein array intervals of the plurality of component holding devices of the transfer head are coincident with array intervals of the component feed sections.

8. A component mounting apparatus comprising:

a transfer-head moving device (22, 24, 26) for laterally movably supporting a transfer head (28, 29) operable to hold components and place the components onto a board (12), the transfer-head moving devices being provided
5 above the board on which the components are to be mounted;

a plurality of juxtaposed component holding devices (38a, 38b, 38c, 38d, 39) provided on the transfer head and operable to hold the components; and

a plurality of juxtaposed component feed sections
10 (30) having a plurality of components accommodated therein and operable to feed the components to the component holding devices,

wherein array intervals of the plurality of component holding devices of the transfer head are
15 coincident with intervals of component placing positions on the board where the components held by the component holding devices are to be placed.

9. A component mounting apparatus according to Claim 6, wherein the component-holding-device moving mechanism
20 (900, 901) can adjust array intervals of the plurality of component holding devices of the transfer head so that the array intervals of the plurality of component holding devices become coincident with component array intervals of the component feed sections.

25 10. A component mounting apparatus according to Claim

6, wherein the component-holding-device moving mechanism (900, 901) can adjust array intervals of the plurality of component holding devices of the transfer head so that the array intervals of the plurality of component holding devices become coincident with array intervals of the component feed sections.

11. A component mounting method including: moving a transfer head (28, 29) on which a plurality of component holding devices (38a, 38b, 38c, 38d, 39) operable to hold components are mounted; making the components held by the component holding devices from a component feed section (30) with a plurality of components arrayed thereon; and thereafter lowering the component holding devices at over component placing positions of a circuit board (12), thereby placing the components held by the component holding devices onto the circuit board, the method comprising:

before performing either one of an operation of holding the plurality of components by the plurality of component holding devices of the transfer head and an operation of placing the plurality of components, moving the component holding devices to adjust intervals between adjacent component holding devices at the transfer head so that the intervals between adjacent component holding devices become coincident with array intervals of the

plurality of components targeted for the either one operation; and

thereafter performing the either one operation by the plurality of component holding devices of the transfer head.

12. A component mounting method according to Claim 11, wherein the either one operation is the operation of holding the plurality of components, and the array intervals of the plurality of components targeted for the either one operation are array position intervals of component array of the component feed section.

13. A component mounting method according to Claim 11, wherein the either one operation is the operation of placing the plurality of components, and the array intervals of the plurality of components targeted for the either one operation are array position intervals of the component placing positions on the board.

14. A component mounting method according to any one of Claims 11 to 13, further comprising:

before adjusting the intervals between adjacent component holding devices, obtaining array position information as to the plurality of components targeted for the either one operation and, based on the obtained array position information as to the plurality of components targeted for the either one operation, determining the

plurality of component holding devices (38a, 38b, 38c, 38d, 39) operable to hold components are mounted; making the components held by the component holding devices from a component feed section (30) with a plurality of components arrayed thereon; and thereafter lowering the component holding devices at over component placing positions of a circuit board (12), thereby mounting the components held by the component holding devices onto the circuit board, the apparatus comprising:

10 a component-holding-device moving mechanism (900, 901) provided on the transfer head and operable to move the component holding devices so as to adjust array intervals of the plurality of component holding devices;

15 a control section (52) which can perform control for, before performing either one of an operation of holding the plurality of components by the plurality of component holding devices of the transfer head and an operation of placing the plurality of components, driving the component-holding-device moving mechanism (900, 901) to
20 move the component holding devices so as to adjust intervals between adjacent component holding devices at the transfer head so that the intervals between adjacent component holding devices become coincident with array intervals of the plurality of components targeted for the
25 either one operation, and thereafter performing the either

one operation by the plurality of component holding devices of the transfer head.

19. A component mounting apparatus according to Claim 18, wherein the either one operation is the operation of holding the plurality of components, and the array intervals of the plurality of components targeted for the either one operation are array position intervals of component array of component feed section.

20. A component mounting apparatus according to Claim 18, wherein the either one operation is the operation of placing the plurality of components, and the array intervals of the plurality of components targeted for the either one operation are array position intervals of the component placing positions on the board.

21. A component mounting apparatus according to any one of Claims 18 to 20, further comprising: an arithmetic section (1002) for, before adjusting the intervals between adjacent component holding devices, determining the array intervals of the plurality of components targeted for the either one operation based on array position information as to the plurality of components,

wherein the control section (52) can perform control for driving the component-holding-device moving mechanism (900, 901) to move the component holding devices so as to adjust intervals between adjacent component

holding devices so that the intervals between adjacent component holding devices at the transfer head become coincident with array intervals of the plurality of components targeted for the either one operation determined
5 by the arithmetic section (1002), and thereafter performing the either one operation by the plurality of component holding devices of the transfer head.

22. A component mounting apparatus according to any one of Claims 18 to 21, wherein the control section is
10 operable to adjust the array intervals of the plurality of component holding devices of the transfer head by driving the component-holding-device moving mechanism (900, 901) during the move of the transfer head.

23. A component mounting apparatus according to Claim
15 21, further comprising: a storage device (1101) for previously storing the array position information,

wherein the arithmetic section is operable to determine the array intervals of the plurality of components based on array position information as to the
20 plurality of components read from the storage device.

24. A component mounting apparatus according to Claim
21, further comprising: a component-array-position-information recognition device (905) disposed on the transfer head and operable for recognizing the component
25 array position information,

wherein the arithmetic section (1002) is operable to determine the intervals between adjacent component holding devices at the transfer head based on the component array position information as to the component placing positions on the board recognized by the component-array-position-information recognition device.

25. A component mounting method according to Claim 12, wherein the either one operation is the operation of holding the plurality of components, and the array intervals of the plurality of components targeted for the either one operation are array position intervals of component array of the component feed sections,

the method further comprising: instead of moving the component holding devices so that the intervals between adjacent component holding devices at the transfer head become coincident with the array intervals of the plurality of components targeted for the either one operation, moving the plurality of component feed sections so that the array intervals of the plurality of component feed sections become coincident with the intervals between the adjacent component holding devices at the transfer head; and

thereafter performing the operation of holding the plurality of components at the plurality of component feed sections by the plurality of component holding devices of the transfer head.

26. A component mounting apparatus according to Claim 19, wherein the either one operation is the operation of holding the plurality of components, and the array intervals of the plurality of components targeted for the either one operation are array position intervals of component array of the component feed sections,

the apparatus further comprising: instead of the component-holding-device moving mechanism, a component-feed-section moving mechanism (120) for moving the plurality of component feed sections so that array intervals of the plurality of component feed sections become coincident with the intervals between adjacent component holding devices at the transfer head, and

wherein the control section (52) is operable to perform control for, before performing the operation of holding the plurality of components by the plurality of component holding devices of the transfer head, driving the component-feed-section moving mechanism (120) to move the component feed sections so as to adjust intervals between adjacent component feed sections so that the array intervals of the plurality of component feed sections become coincident with the intervals between the adjacent component holding devices of the transfer heads; and thereafter performing the operation of holding the plurality of components by the plurality of component

holding devices of the transfer head.